Model for *Pinus halepensis* Middle Ebro Valley (Aragón) and Cataluña (Spain)

Model

Phalepensis__cat_ar__v01

Model description

- Especie: *Pinus halepensis* Mill.
- Spanish Forest Inventory (SFI) code: 24
- Geographical area: middle Ebro Valley (Aragón) and Cataluña
- Geographical area (administrative): Huesca, Zaragoza, Girona, Barcelona, Lleida and Tarragona

Model type

- Category: growth
- Model level: distance independent individual tree model
- Reproduction methods: seedling forest
- Stand structure: even-aged stands
- Species composition: monospecific stands
- Forest origin: natural stands (very high post-fire regeneration)

Model requirements and recommended use

- Initial inventory requirements: age and dominant height of the plot; expan and dbh of the trees. Slope of the plot is needed in order to calculate mushrooms variables
- Geographical area: middle Ebro Valley (Aragón) and Cataluña, closer places and another places with similar characteristics (assuming differences)
- Stand type: monospecific stands
- Execution recommended time: 10 years executions (growth equation developed by using that criteria)
- Site Index is defined as top height at a base age of 60 years

Figure 1: *Pinus halepensis*, extraído de Accurimbono con licencia CC BY-SA 3.0

Figure 2: Detalles de *Pinus halepensis*, extraído de The New York Public Library

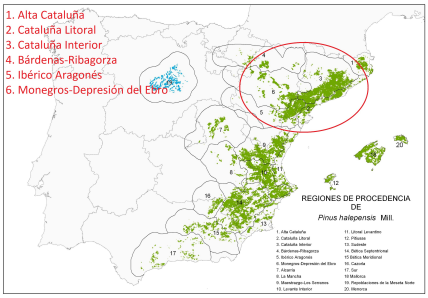


Figure 3: Regiones de procedencia de *Pinus halepensis* en España, extraído de MAPA

Bibliography

Model components:

- **Site Index equation**:
  Saldaña AMC (2010). Bases para la gestión de masas naturales de Pinus halepensis Mill. en el Valle del Ebro (Doctoral dissertation, Universidad Politécnica de Madrid)
  Rojo A, Saldaña, AM, Barrio-Anta M, Notivol-Paíno E, Gorgoso-Varela JJ (2017). Site index curves for natural Aleppo pine forests in the central Ebro valley (Spain)

- **Diameter growth equation**:
  Trasobares A, Tomé M, Miina J (2004). Growth and yield model for Pinus halepensis Mill. in Catalonia, north-east Spain. Forest ecology and management, 203(1-3), 49-62

- **Ingrowth equation**:
  Trasobares A, Tomé M, Miina J (2004). Growth and yield model for Pinus halepensis Mill. in Catalonia, north-east Spain. Forest ecology and management, 203(1-3), 49-62

- **Ingrowth distribution**:
  By default

- **General calculations: bal, g, slenderness, normal circumference**:
  Standard equations

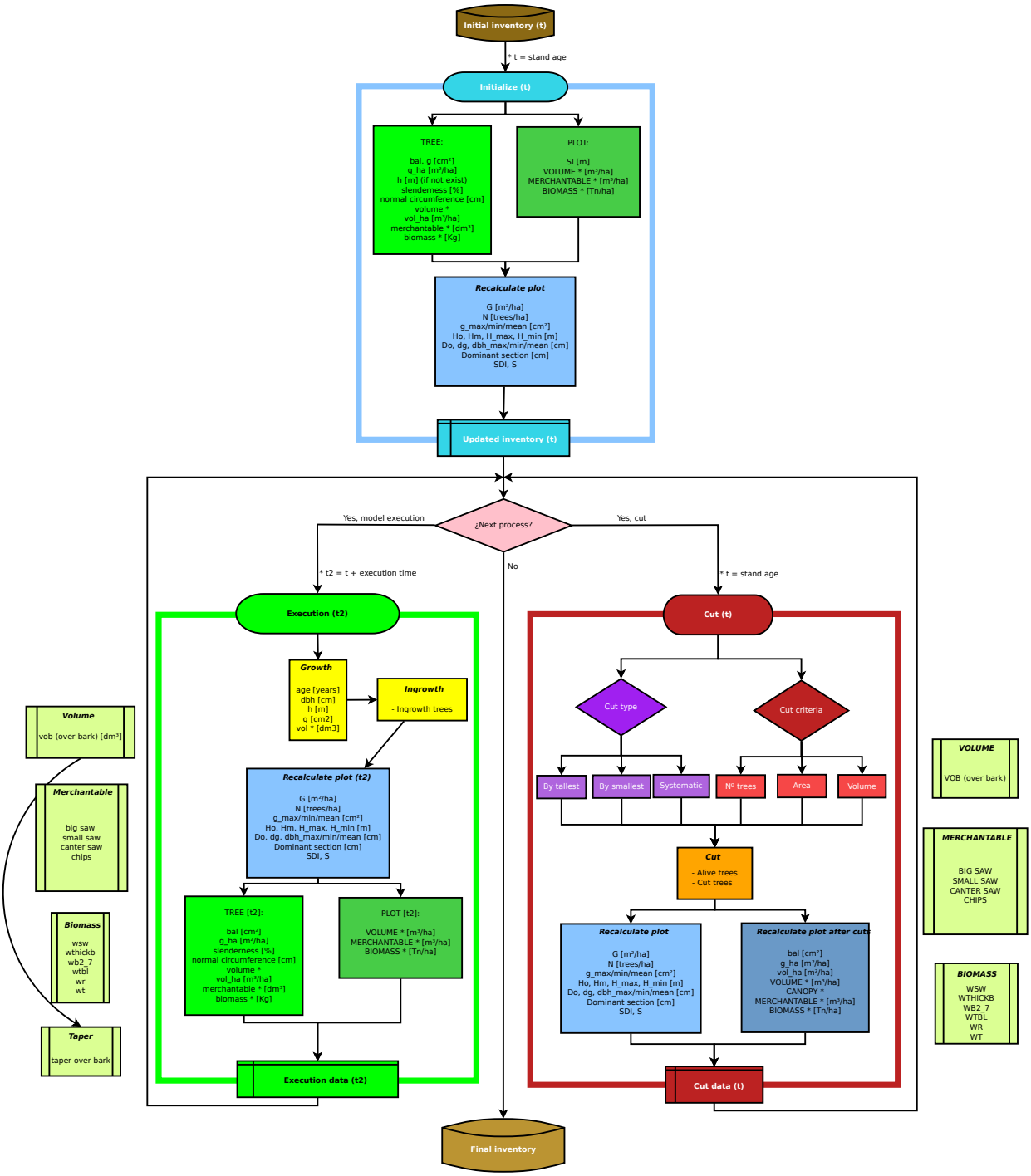
- **Generalized height-diameter equation**:
  Saldaña AMC (2010). Bases para la gestión de masas naturales de Pinus halepensis Mill. en el Valle del Ebro (Doctoral dissertation, Universidad Politécnica de Madrid)

- **Taper equations over bark (volume)**:
  Saldaña AMC (2010). Bases para la gestión de masas naturales de Pinus halepensis Mill. en el Valle del Ebro (Doctoral dissertation, Universidad Politécnica de Madrid)

- **Biomass equations**:
  Ruiz-Peinado R, del Rio M, Montero G (2011). New models for estimating the carbon sink capacity of Spanish softwood species. Forest Systems, 20(1), 176-188

- **Technological wood uses information**:
  Rodríguez F (2009). Cuantificación de productos forestales en la planificación forestal: Análisis de casos con cubiFOR. In Congresos Forestales

- **Value for Reineke Index equation**:
  Aguirre A, Condés S, del Río M (2017) Variación de las líneas de máxima densidad de las principales especies de pino a lo largo del gradiente estacional de la Península Ibérica. 7 Congreso Forestal Español


Initial inventory (t)
* t = stand age
Initialize (t)
TREE:
bal, g [cm²]
g_ha [m²/ha]
h [m] (if not exist)
slenderness [%]
normal circumference [cm]
volume *
vol_ha [m³/ha]
merchantable * [dm³]
biomass * [Kg]
PLOT:
SI [m]
VOLUME * [m³/ha]
MERCHANTABLE * [m³/ha]
BIOMASS * [Tn/ha]
Recalculate plot
G [m²/ha]
N [trees/ha]
g_max/min/mean [cm²]
Ho, Hm, H_max, H_min [m]
Do, dg, dbh_max/min/mean [cm]
Dominant section [cm]
SDI, S
Updated inventory (t)
¿Next process?
Yes, model execution
Yes, cut
No
* t2 = t + execution time
* t = stand age
Execution (t2)
Growth
age [years]
dbh [cm]
h [m]
g [cm2]
vol * [dm3]
Ingrowth
- Ingrowth trees
Recalculate plot (t2)
G [m²/ha]
N [trees/ha]
g_max/min/mean [cm²]
Ho, Hm, H_max, H_min [m]
Do, dg, dbh_max/min/mean [cm]
Dominant section [cm]
SDI, S
TREE [t2]:
bal [cm²]
g_ha [m²/ha]
slenderness [%]
normal circumference [cm]
volume *
vol_ha [m³/ha]
merchantable * [dm³]
biomass * [Kg]
PLOT [t2]:
VOLUME * [m³/ha]
MERCHANTABLE * [m³/ha]
BIOMASS * [Tn/ha]
Execution data (t2)
Cut (t)
Cut type
Cut criteria
By tallest
By smallest
Systematic
Nº trees
Area
Volume
Cut
- Alive trees
- Cut trees
Recalculate plot
G [m²/ha]
N [trees/ha]
g_max/min/mean [cm²]
Ho, Hm, H_max, H_min [m]
Do, dg, dbh_max/min/mean [cm]
Dominant section [cm]
SDI, S
Recalculate plot after cuts
bal [cm²]
g_ha [m²/ha]
vol_ha [m³/ha]
VOLUME * [m³/ha]
CANOPY *
MERCHANTABLE * [m³/ha]
BIOMASS * [Tn/ha]
Cut data (t)
Volume
vob (over bark) [dm³]
Merchantable
big saw
small saw
canter saw
chips
Biomass
wsw
wthickb
wb2_7
wtbl
wr
wt
Taper
taper over bark
VOLUME
VOB (over bark)
MERCHANTABLE
BIG SAW
SMALL SAW
CANTER SAW
CHIPS
BIOMASS
WSW
WTHICKB
WB2_7
WTBL
WR
WT
Final inventory

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Interest Links

SiManFor: Support system for simulating Sustainable Forest Management Alternatives (2020) In: SiManFor. http://www.simanfor.es/. Accesed 15 May 2020

Sustainable Forest Management Research Institute UVa-INIA (iuFOR) (2020) In iuFOR. http://sostenible.palen Accesed 15 May 2020

Higher Technical School of Agricultural Engineering of Palencia. (2020) In: ETSIIAA Palencia. http://etsiiaa.uva.es/. Accesed 15 May 2020

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